Center Independent Research & Development: JPL IRAD

Advanced photon detectors using superconducting MgB2 films

Completed Technology Project (2012 - 2013)

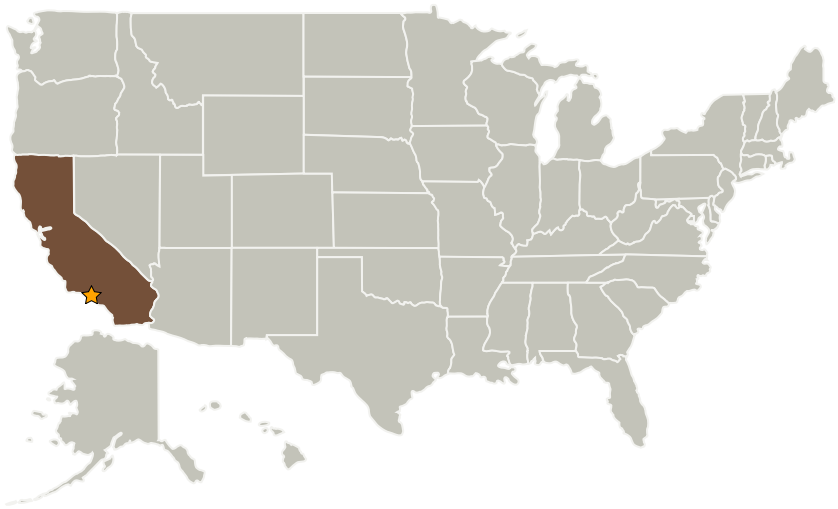
Project Introduction

The goals of the proposed work are to Investigate the film thickness (10–50 nm), substrate material (c-plane sapphire, MgO), and temperature (20-35 K) dependencies of the IF bandwidth in order to understand its upper limit; Investigate the operation of mixer devices of different lateral size (0.2-5 μm2) and establish the minimum size limit not leading to the degradation of the microdevice characteristics (TC, critical current, resistivity); Validate the THz operation of quasioptical MgB2 mixers through measurements of the noise temperature, IF bandwidth (ΔfIF), and required LO power at 0.6 THz, 1.5 THz, and 2.5 THz. The targets are: TM ≤ 1000K, PLO ≈10 μW, ΔfIF ≈ 20 GHz.

Anticipated Benefits

Projects will benefit from new materials.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

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Primary U.S. Work Locations

California

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

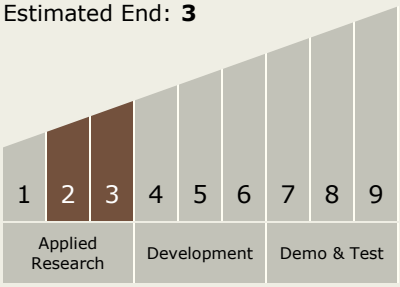
Jonas Zmuidzinas

Principal Investigator:

Boris S Karasik

Technology Maturity (TRL)

Start: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes